43rd YEAR OF PUBLICATION

SCHOOL AND SOCIETY

WILL THE FOREIGN STUDENT BE SQUEEZED OUT?
By JAMES M. DAVIS—Page 299

DUTCH SCHOOL DILEMMA
By NORMAN H. WILSON—Page 301

OCTOBER 26, 1957

VOLUME 85

NUMBER 2118

The Search for Scientists

SIX SUGGESTIONS FOR MORE SCIENTISTS AND ENGINEERS
VERNON JONES—Page 303

CAN WE FIND THE LATENT SCIENTISTS?
JOHN R. HILLS—Page 306

DECLINE AND FALL OF HIGH-SCHOOL PHYSIOLOGY
SIDNEY ROSEN—Page 308

FACTORS RELATED TO ACADEMIC PROBATION AMONG FOREIGN GRADUATE STUDENTS
PETER TIMOTHY HOUNTRAS—Page 311

Report

HEURISTIC DEVICES FOR TEACHING SOCIOLOGY
MARVIN R. KOLLER—Page 312

Events

MERIT RATING OF TEACHERS; COLLEGE STUDENTS' CAREER CHOICES; RELIEVING COLLEGE ENROLLMENT PRESSURES; NEW DIVISIONAL COURSES FOR SENIORS AT POMONA; "SUPERIOR" AND "POOR" TEACHERS; COURSES IN RELIGION AT UNIVERSITY OF ILLINOIS **313**

EASE PARENT BURDEN OF RISING EDUCATION COSTS

As costs of tuition, room and board rise unavoidably, more than 500 schools and colleges have helped parents meet this problem by adopting The Tuition Plan. The Plan operates at no expense to the school. It offers parents a welcome alternative to lump-sum payments—a convenient monthly payment Tuition Plan contract.

In addition to a fully-paid enrollment at the start of every term and enhanced parent good will, colleges have enjoyed these new benefits of The Tuition Plan:

SCHOOL HAS NO FINANCIAL LIABILITY . . . on parent-signed contracts, schools need not refund in event parent defaults on contract.

A FOUR, THREE OR TWO YEAR PLAN . . . now may be offered under one flexible contract.

LIFE INSURANCE INCLUDED . . . in event parent dies, life insurance takes care of total remaining costs covered by 4, 3 and 2 year contracts.

TTP

THE TUITION PLAN, INC.

347 Fifth Avenue, New York 16, N. Y.

Write today for descriptive brochure.

The Board of Education of The Methodist Church

Presents the first five in its series of "Studies in Christian Higher Education"—

1. ***Problems in College Administration*** by A. J. Brumbaugh *$1.00*
2. ***Building a Faculty in a Church-Related College of Liberal Arts*** by Clarence E. Ficken *$1.00*
3. ***The Education of the Administrator*** by Goodrich C. White *$1.00*
4. ***An Experiment in General Education: Development and Evaluation*** by William E. Kerstetter and Phillips Moulton *$1.00*
5. ***Handbook for Trustees*** by Myron F. Wicke *$ .75*

Order these basic books for the college administrator from

Director of Information and Publications
Division of Educational Institutions
Methodist Board of Education, Box 871
Nashville 2, Tennessee

In November 9th issue

CHRISTMAS IN THE SCHOOLS
By J. Stephen Sherwin

SCHOOL and SOCIETY

FOR THE BETTER COLLEGE AND UNIVERSITY TEACHING POSITIONS
consult
Illiana Teachers Service
Champaign, Illinois
Nation-wide Service

FACULTY PLACEMENT SERVICE

Secondary **College**
Elementary **University**

Service Where Service Counts
BTB

BRYANT TEACHERS BUREAU
1025 Witherspoon Bldg.,
Walnut and Juniper Sts.,
PHILADELPHIA 7, PA.
Pennypacker 5-1223

SCHOOL AND SOCIETY

WILLIAM W. BRICKMAN
Editor

STANLEY LEHRER
Managing Editor

Trustees: Chairman, RAYMOND WALTERS, President Emeritus, University of Cincinnati
JAMES E. ALLEN, JR., Commissioner of Education, New York State Education Department
THEODORE A. DISTLER, Executive Director, Association of American Colleges
FRANCIS KEPPEL, Dean, Graduate School of Education, Harvard University
ERNEST O. MELBY, Distinguished Professor of Education, Michigan State University
GEORGE D. STODDARD, Dean, School of Education, New York University
ROSCOE L. WEST, President, New Jersey State Teachers College, Trenton
Treasurer: STANLEY LEHRER
Secretary: WILLIAM W. BRICKMAN

SCHOOL AND SOCIETY is published biweekly, except in July and August, by the Society for the Advancement of Education, Inc., 1834 Broadway, New York 23, N. Y. Second-class mail privileges authorized at Princeton, N. J. **Editorial and Executive Offices:** 1834 Broadway, New York 23, N. Y. Contributors should provide adequate postage for return of unacceptable manuscripts or illustrative matter. No material may be reprinted without permission of the editors and of the authors of signed articles. Opinions expressed in signed articles do not necessarily represent the views of the editors and the Society.

Subscription: $7.50 (1 year), $14.50 (2 years). Add $1.00 per year for postage on foreign orders.

Current and Back Copies: 35c a copy within one month of publication date (two or more current copies, 30c each); less than one year, 50c; one to five years, 75c. Special rates for older issues and complete volumes.

Advertising: Copy and cuts must be submitted to Advertising Manager at least two weeks before publication. Rate card available on request.

Education's International Journal

Will the Foreign Student Be Squeezed Out?

By JAMES M. DAVIS
University of Michigan, Ann Arbor

WILL THE INCREASING pressure of American students seeking admission to our colleges and universities result in these institutions cutting sharply or even eliminating their admissions of students from other lands? A recent letter to the editor in a prominent Midwestern newspaper set the problem in its simplest terms:

> Our State University is overcrowded, and one of the causes is that students from other states and foreign countries are allowed to matriculate there although in many instances they have fine colleges and universities in their own state or country.
>
> The founders of SU intended it to be used as an educational institution for legal citizens of our own state, and the admittance of students from other states and countries is a definite misuse of the university.

Conditions causing such sentiments are not hard to identify. They include a larger percentage of young people and adults attending colleges and universities and an expanding number of American youth now approaching college age, resulting in predictions of shortages of buildings, libraries, equipment, and land for institutions of higher education and the mounting concern over the present shortage of college teachers in science and engineering fields spreading to other fields.

In budget hearings, legislators readily transmit views similar to those of the letter-writer quoted above to the administrators of state colleges and universities. Faced with the need to get the funds necessary to operate and to expand their institutions, these administrators are tempted to reduce sharply the admission of foreign students. Similar pressures upon private institutions operate equally effectively, if less openly.

As the pressures increase, one may expect to hear some apparently sound arguments against international services. No doubt it will be pointed out that a foreign student displaces the son or daughter of a constituent (what about the thousands of Americans studying abroad?); that foreign students require more personnel services than do American students (but not ROTC, military counseling, or most physical education programs—and these are among the more expensive); and that many of the people who support our institutions see no very significant benefits accruing to them from the presence of students from other lands.

In the national picture, we find a different climate of opinion. In his budget message which asked the Congress to appropriate a 50% increase in funds for Federal activities in International Educational Exchange, President Eisenhower stated:

> The intensified worldwide ideological conflict emphasizes the importance of the role of both the Government and private organizations in exchanging information, persons and ideas abroad. Overseas information services and cultural exchanges are designed to facilitate sympathetic understanding of American life, culture, and institutions by other peoples. Another major role of these programs is to demonstrate to the people of other nations the way in which American policies and objectives are in keeping with their own aspirations.

He recognized the critical importance of this program, especially in Asia and Africa, adding, "Emphasis will be placed on person-to-person contacts on both official and unofficial levels."

The U. S. Advisory Commission on Educational Exchange, a body of distinguished citizens which has been studying this program constantly, stated, Jan. 3, 1957:

> The Commission is of the firm conviction that the international educational exchange program of Public Law 402 which was formally authorized in 1948 is a powerful influence in the world today for understanding and peace. It is the best long-range means of bringing about understanding between people.
>
> One of the tasks we face today is to keep alive and to promote the principles of democracy which we Americans cherish. This can be done by increasing our educational and cultural exchange activities.

On Sept. 11-12, 1956, a group of leading American citizens was called together by President Eisenhower to discuss new roads to international understanding. In his letter of invita-

tion to the conference members, the President said,

> If our American ideology is eventually to win out in the great struggle being waged between opposing ways of life, it must have the active support of thousands of independent private groups and institutions and millions of individual Americans acting through person-to-person communication in foreign lands.

He made it quite clear that he was "talking about the exchange of professors and students and executives, the providing of technical assistance, and of the ordinary traveler abroad." He concluded that "there is no more important work than that in which we are asking you to participate."

Cultural affairs officers in American embassies and in a great many American consulates abroad have the facilitation of internationl educational exchange programs as a major function. This is one more item testifying to the importance given such programs by the national government. Thus, in seeking an answer to the question, "Will the foreign student be squeezed out?" we find significant limiting pressures at the local levels and great expansive pressures at the national level.

Implicit in this analysis is the philosophy that, in a democratic society, any institution must be responsive to its constituents. Unless a college or university maintains the approval of the taxpayers or private citizens who make up its constituency, it cannot long endure.

Will the foreign student be squeezed out? The foreign student will not be squeezed out if it appears to be in the interest of our constituents to keep him here.

A positive approach to the creation and sustaining of the support of our constituents for international student programs might well consider the institution itself and the community of constituents which it serves. Sound public relations begin with the program for which support is sought. Few can be critical of a general tightening up of our procedures. More selective admissions based upon a sound assessment of the students' preparation and ability to profit from the program offered, together with more attention to English language competence, are indicated.

There is a widespread tendency to be lenient in grading foreign students and in holding them to specific degree requirements. This is causing our country embarrassment abroad. The "foreign student degree" is occasionally misunderstood abroad as a means by which a college or university serves its own interest by having foreign students in residence and giving them degrees based upon second-rate work. Throughout South Asia and the Near East I found genuine concern about this problem expressed by our returned alumni, by American faculty members in such institutions as the American Universities of Beirut and Cairo and Robert College in Istanbul, and also by our cultural affairs officers in American embassies.

On the basis of interviews with educators, alumni, and officials of government in a number of "underdeveloped" countries last year, I was forced to reject completely the view that a student who is really not fully trained in his professional field here may be, nevertheless, among the most competent people in his own country when he returns. The fact is that his incompetence will be even more evident if there is a real shortage of trained professionals and that his American education will be judged by the knowledge and skill he has. His colleagues who have degrees from British, French, or German universities, many of whom will be senior to him, will be especially severe in their evaluations. It helps neither the student, his own country, the United States, nor the institution which educated him to give an academic degree on the basis of a courtesy or second-rate standard.

The work of foreign student advisers is another aspect of the internal picture which we must consider. They are in a supporting role, performing a service function. Through personnel and administrative services they seek to support that learning process by helping the student deal with anything which may be impeding it. The foreign student adviser is in a strategic position, but he is always second in importance to the teaching faculty and his work finds its justification in the support of the academic program.

One of the most rewarding aspects of our work in the international student program at the University of Michigan is the widespread appreciation of the value and importance of international cultural exchange on the part of the regents, the administrative officers, the

faculty members, and the non-academic employees. At no time is this widespread interest more clearly evident than when our faculty and staff colleagues travel abroad. Everywhere they go they meet our alumni. They discover first-hand what I learned from talks with hundreds of our returned alumni in the course of a trip around the world last year. They see in our returned alumni their self-evident loyalty and affection for their American alma mater, their readiness to understand the American viewpoints without sacrificing their own primary national loyalties, and their general effectiveness in the professions.

At our university we recognize some 25 alumni clubs abroad as integral parts of our Alumni Association. We include them in our mailings, encourage their members to visit Ann Arbor, and almost weekly the alumni secretary or I write letters of introduction to help a traveling faculty member to meet an alumnus of the university in the country which he is visiting. Of course, most of the faculty members who go abroad make their alumni contacts directly with their own students and we never hear about them.

One of the most obvious ways to strengthen the acceptance of foreign students here is to help our own best qualified students to study abroad. When Americans themselves become foreign students abroad, they and their families gain a new perspective on the foreign student here. I notice that year after year the American students most active in our international student program are those who have studied and traveled abroad. Thus, it is a clear-cut function of the American college to offer information and counsel to the student contemplating study abroad.

Study tours abroad for credit have gained increasing acceptance wherever they have been undertaken on the basis of soundly conceived and effectively implemented academic objectives and procedures. Any institution which can utilize the world outside the borders of the United States to actualize its academic offerings and stimulate broader and deeper learning will find no lack of support for its international services.

Foreign students can help our own native Americans to achieve a clearer understanding of many of the subjects which are offered in our curricula. Some of the most valuable educational experiences occur informally in dormitories when talk flows freely between American and foreign students. As foreign students go home for holidays with their American friends, as they visit our communities on tours as overnight or weekend guests of local families, and as they speak to our organizations, an opportunity is given to our constituents to achieve an enthusiastic understanding of the values which student exchange activities can have for them.

We must help our constituents see the local importance of national viewpoints. If the People-to-People Program can effectively localize our national objectives in the exchange of persons area; if it can extend a recognition of the necessity for international understanding into more and more communities; if more people talk and write to more people between countries—then the unfortunate and shortsighted dichotomy between the negative local pressures against foreign students and the positive national pressures for them may be bridged.

In conclusion, it seems to me that in the years ahead the foreign student will be squeezed. If we understand the forces squeezing him and can accentuate the positive forces in his favor, he will not be squeezed out.

Dutch School Dilemmas

By NORMAN H. WILSON [1]
Bronxville (N. Y.) High School

HOLLAND'S critical school shortage is partly caused by the postwar birth rate (in 1948, 25.3 births per 100 compared to 24.2 in the U.S.). Enrollment in post-elementary schools is increasing, but funds are insufficient for needed new buildings, furnishings, learning materials, and salary increases. Before the teacher shortage,

[1] Fulbright student, University of Utrecht, 1955-56.

elementary school classes were limited to about 35, but now they average slightly over 40. The "personnel-wanted" sections of professional journals carry the pleas of countless communities for teachers at all levels.

The 21-year-old beginning teacher with a four-year training school diploma earns just under 300 guilders (c. $150) monthly. An elementary school teacher with a principal's certificate can earn 566 guilders monthly after 20 years' experience. The beginning secondary school teacher, who must have a university degree or its equivalent, earns 577 guilders monthly. Representatives of teachers from the many levels of schools in Holland's complicated system are constantly jockeying for a more favorable financial position.

The need for secondary school reforms is demonstrated by the high rate of repeaters. Four out of five students in secondary schools have to repeat at least one year. In some schools the drop-out rate is over 50%. The rigorous curriculum requires that students have an academic aptitude well above average. In the five-year H.B.S. (Higher Citizens School), the student has five years of Dutch, French, and English, four of German, plus mathematics, physics, chemistry, biology, drawing, history, geography, economics, civics, bookkeeping, and physical training. In the fourth and fifth years, he can specialize in either scientific or commercial courses. The six-year Gymnasium student must take six years of Latin, Dutch, and French, five of Greek and English, four of German, as well as history, geography, mathematics, physics, chemistry, biology, drawing and physical training. In the last two years the student can choose between more scientific or more humanities courses. Much learning material is packed into the pre-university study, for national examinations are given at the close of the student's final year.

The academic emphasis of Dutch education produces many well-trained individuals, but a high price is paid for the system's benefits: some teachers are too eager to pump minute facts into saturated pupils, while many others have not been trained to consider individual differences among learners, motivational factors, or the development of any mental factor save memory. These teachers are primarily hired as subject specialists and start teaching on a "sink or swim" basis. Not until 1956 was there a chance for teacher trainees in universities to have practical experience in the classroom. Elementary school grouping is often done on the basis of whether pupils have the potential to attend secondary school. In general, 10-25% of an elementary school group will be prepared for the secondary school admission tests. "Cramming" for these tests and the first years of secondary school begins in the fourth or fifth grade of many schools. The other students, destined for vocational, technical, or four-year advanced elementary schools, often seem devalued because of their "inferior" intellectual ability.

Reports about the merits of new methods, particularly those emanating from the U.S. and England, are skeptically received by many Dutch teachers. If progress means loose family ties, materialism, and juvenile delinquency—all headlined characteristics of these nations—then the old Dutch ways do not seem so bad.

However, teacher-training programs have been modernized. Three government-subsidized study centers for in-service training employ staffs of lecturers, research workers, and publicists to help teachers learn about and experiment with new methods. The pedagogical institutes at national universities offer well-attended in-service courses. Numerous conventions and conferences are helping to weld together the lower and higher school programs. Several types of experimental schools are having a liberalizing influence. Schools for handicapped and disturbed children, such as the well-known open-air schools, have sensitized many educators to the emotional and physical needs of children. The philosophy, methods, and materials of these comparatively few experimental centers have had a remarkably large impact on the more traditional, well-established schools.

In 1955, to reduce the teacher shortage, the Ministry of Education awarded scholarships and loans to almost 2,500 teacher trainees—one-fifth of the nation's total—and accelerated training programs for graduates of secondary schools. In 15 months volunteers are trained for elementary school teaching. Although they are not committed to teach when they finish the course, trainees receive 100 guilders a month expense money plus free tuition. Deferments are given irreplaceable male teachers of draft age. These government measures enabled the teacher supply to keep pace with elementary-school pupil

increase in 1955 but failed to alleviate the previously existing shortage.

Although the government raised salaries slightly in 1956, demands for further increases continue. Greater increases were given advanced elementary school teachers to make teaching at this level more attractive. Other teachers are now agitating for similar preferential treatment.

In the first half of this decade, 339 elementary schools were built, an increase of almost five per cent of the 1950 total, while the number of technical schools has been increased 50% since 1948. The Central Bureau of Statistics reports that more than one-fourth of those in the 13-17 age group now attend technical schools, representing an increase of 22,000 students. The many temporary buildings reduce optimism which reports on school construction might create.

In 1920, after a century of sharp debate, the government established the principle of equal subsidies for public, parochial, denominational, and private schools. The Ministry of Education, while controlling to a large extent a school's academic content, allows complete freedom of philosophy to all but public (neutral) schools. Churches and church-sponsored groups often take the initiative in establishing and maintaining schools. As a result, almost 75% of the elementary school children attend religiously oriented schools.

Teachers unions, in-service training programs, and conferences and conventions are clustered around three nuclei: Catholic, Protestant, or neutral religious affiliation. Communications between the three groups are channeled largely through the upper echelons, *i.e.*, the universities and government committees. Although efforts are being made to attack the rift, many educators believe that neither the Ministry of Education nor the schools can alter attitudes which are so deeply rooted.

The earnest effort of all segments of Dutch society will be required to meet the present crisis and future problems of Dutch education. It is hoped that, in meeting the crisis, the Dutch can rekindle the spirit of unity which has glowed through periods of great stress in their recent history.

Six Suggestions for More Scientists and Engineers

By VERNON JONES
Clark University, Worcester, Mass.

THERE IS TODAY, as always, the over-arching responsibility upon teachers in a democracy to educate the oncoming generation to become efficient, dedicated, and wise citizens of their community and nation. This is, and probably will continue to be, the main over-all objective of our schools. The opportunity for the schools to sharpen up their attention to ways and means of identifying and developing more scientists and engineers for the years ahead seems clearly to be one concrete job of significance and immediacy under this general citizenship objective. In giving the necessary attention to society's call, there need be no decrease in emphasis on general education.

Educators might well assess the genuineness of the rapidly growing concern, in the areas of national security, health, industrial development, and teaching, for the training of more young people of ability in mathematics and science. Investigation upon investigation is showing that too few students of ability are electing advanced mathematics and science courses in secondary schools. In many high schools a fourth year of mathematics is not offered, and often either chemistry or physics is given—not both. No finger of blame should be pointed at teachers or the schools for this state of affairs. These subjects often have been considered as "hard" subjects by students and their parents, and the need for them in many schools has been small as judged by students' choices. In our society many of our children and youth, with parental approval, have tended to shy away from hard and exacting subjects. In recent years we have, as a nation, been heavy purchasers of the idea of permissiveness in the upbringing of children. Our bright children, even more than

the average and slow, often have not been motivated to do their best. This has contributed toward a waste of the nation's most priceless resource. With proper planning, many able boys and girls can learn mathematics and science much faster than they have in the past. But to effect such changes educators need parental and general community co-operation and support.

We believe the psychological time for the eliciting and using of such co-operation has arrived. Strong and friendly lay groups all over the nation are seeing the need for more young scientists and engineers, and educators have a unique opportunity to take the lead in each community in trying to organize all possible co-operating forces for the solution of the problem. For educators to take the lead will serve to show that the critics of the schools have been harping on minor themes which will quickly be forgotten in the face of courageous leadership in this very important task. For educators to take the lead will make it uninviting or unnecessary for other agencies and groups to suggest or dictate plans which may be difficult for teachers and school administrators to carry out. Now is the time for every educator who thinks he may have an idea to come forward with it, bearing in mind that the ideas that get translated into action in one community will be different from those in another.

Leadership from Educators. The logical person to stimulate group thinking among leading representatives of interested groups in most communities is the superintendent of schools, the principal of the high school, or a leading science teacher with the backing of the superintendent. School administrators in most communities must be given credit for having exercised wise leadership in obtaining financial support for the schools. In seeking to spark group thinking on the problem of developing more young people in science and mathematics, educators will receive much more ready support from leaders of business, industry, agriculture, health, and national security than they have received in their drives for school financing. For educators to work with these community leaders on the present problem of the shortage of scientists and engineers may involve a feedback in the form of increased confidence and good-will for the schools.

Manpower Survey. Out of such group thinking in a community there might well come the idea of, or the machinery for, the conducting of a manpower survey of potential instructional talent. A pool of resource persons might be built up for a variety of instructional tasks of a specialized nature. Such people might be found, for example, among young scientists and engineers who would like some experience with teachers and youth; from recently retired people; from ex-teachers; from pharmacists, physicians, agricultural experts, and the like. Such resource people might be called upon, for example, by regular staff members in science departments in connection with science fairs, in workshops for special interest or talent groups, for special demonstrations, trips, etc.

The fields of science are developing so rapidly today that it is very difficult, if not impossible, for the teachers in secondary schools to keep up with the developments in all the areas of science which they are expected to cover. The matter is complicated by the unsystematized bits of science information which many boys and girls pick up from the different mass media, notably the popular science magazines and television. The day has passed when the science teacher should be expected to be a specialist in all the areas in his courses. What the teacher should be expected to do is to be a director of learning. He should be able to bring to students all possible resources for learning, not only books and laboratory facilities but also people. He should be in a position to send the able and serious youngster with a specialized problem, if it is significant, to the community's specialist in that area. Perhaps by special organizing efforts the science and mathematics staff of a school might even be able to provide, particularly for the more gifted and advanced students, special workshops, institutes, and possibly advanced courses with the co-operative help of such interested lay specialists.

Co-operative Training of Teachers. Much that has been said above about the science and mathematics pools serving children directly might be used to better advantage in some communities, in the form of workshops, institutes, special lectures, demonstrations, trips, and audio-visual materials for teachers. In this area the potential co-operation between insti-

tutions of higher learning and the secondary schools should be especially stressed. The American Association for the Advancement of Science and other national groups are studying this matter to determine ways and means by which teachers and other specialists in colleges, universities, and professional schools can assist secondary schools in their mathematics and science instruction. Special summer institutes for teachers of mathematics and science, workshops on particular topics (such as electronics and atomic energy), after-school and extension courses in science, informal conferences, and assistance with science fairs — these are among the possibilities. Any needs of school teachers and administrators for assistance from science and engineering faculties of colleges probably will be more sympathetically considered today than ever before.

Identification of Scientific Talent. Greater efforts can be made in most communities to identify boys and girls with talents in science and mathematics. Colleges and universities can assist in this search for talent in junior and senior high schools if the schools desire the help. Psychological tests are now available which can be of substantial value in identifying children with aptitudes for mathematical and scientific thinking. These tests can be of value as early as the end of the junior high or the beginning of the senior high school. This assertion is based on a considerable amount of psychological field work which the writer has done in the co-operative testing and guidance program between Clark University and many high schools in central Massachusetts and in the "Techniquest" (a testing and guidance program) which has been sponsored by Worcester Polytechnic Institute for 17 years. Many other colleges and universities and special testing services are joining hands with secondary school teachers and guidance experts in identifying mathematical and scientific talent as early as possible.

If young people who have strong aptitudes for mathematics and science and who have no other stronger vocational interest were guided into as many science and mathematics courses as possible, consistent with general education, and if their progress were not impaired by the lack of real interest and slow pace of learning of less promising pupils, great progress could be made. The latter *if* raises many problems, of course, but popular lay support could easily be developed in most communities today for giving priority in more advanced mathematics and science courses to boys and girls who can and will learn the material thoroughly. Special attention should be given to counseling and encouraging able girls to study advanced mathematics and science. Their services will be needed in industry, in teaching, and in other professions.

We must also serve the many young people, especially boys, whose aptitudes and basic interests are directed more toward the study of concrete things than to abstract principles and ideas. With proper identification, guidance and vocational teaching, many of these students may become very proficient technicians in construction, maintenance, production, and defense. For such boys the educator provides two of the basic roots of citizenship: a positive attitude toward self resulting from being successful at something, and saleable skills by which he can make an honest living.

Better Teaching. Some experts on the teaching of mathematics and science say that a sizeable percentage of potentially able children develop fears of, or disinterest in, mathematics and science as a result of poor or unwise introduction to those subjects in the grades. The lack or infrequent use of laboratory or field work early in science courses is often mentioned as a weakness in teaching which may strangle early curiosity and interest of children and youth. Similarly, interest in mathematics may never develop or die early because young learners are not given stimulating experiences with relationships and with uses of the material learned. Doubtless some very good teaching can be done without experiments or applications, but the youth who may be headed toward mathematics and science is likely to be one who enjoys being shown. Often he likes to know why.

Previous suggestions concerning the greater interest in teacher training in mathematics and science, the use of resources from the manpower pool, and the possible help which nearby colleges may provide for in-service training — all these may apply at this point. Of special interest here is the possibility that high-school teachers

of science and mathematics might serve as consultants and resource people for elementary and Junior high-school teachers in the same way the college and university specialist might serve the high schools.

Co-operation by Learned Societies, Government, and Business. Learned societies, the Federal and state governments, and business are actively interested in assisting the schools in a co-operative approach to this vital problem. The National Education Association is exercising its customary lead in sparking interest in this problem and in giving publicity to sound approaches to its solution. The American Association for the Advancement of Science is making a study of the possible assistance which its members, especially those in colleges and universities, can render to secondary schools. The U. S. Department of Health, Education, and Welfare is vitally interested and will doubtless provide more and more help where necessary and if feasible plans are presented. The can be illustrated by their provisions for scholarships, by co-operative working-and-teacher-preparation plans for teachers of science,[1] by interest of industry and other forms of business various plans for employing teachers and prospective teachers of science at well-paying positions during summer vacations, and by plans for their scientists to become members of resource pools for teacher assistance.

Our country's need is the educator's opportunity. We hope that educators will take the lead for the good of the students, the schools, and the country in this period of increasing need for scientists and engineers. Regardless of the urgency of the need at any time for such resources, they cannot be suddenly found or created; the potentialities for them must be identified in children and youth and gradually and systematically developed.

[1] *E.g.*, the Lexington Plan, sponsored by the Arthur D. Little Co., Cambridge, Mass.

RESEARCH

Can We Find the Latent Scientists?

By JOHN R. HILLS

Educational Testing Service, Princeton, N. J.

THERE IS MUCH CONCERN these days about the shortage in the United States of scientific and technical manpower, and it often has been demonstrated that a basic tool of science and technical work is mathematics. It has been suggested that tests of mathematical aptitude could be administered to all high-school students and that those showing high promise could be encouraged in scientific studies. The results of a study[1] by the writer suggest that such a straightforward approach to this problem will be difficult, if not impossible. In fact, there may be no unique trait or constellation of traits which can be called mathematical aptitude.

The writer assembled a battery of tests measuring factors likely to be related to success in mathematics, administered them to students of mathematics, and related the scores to grades and other criteria of success. Factors to be measured by the battery were selected in consultation with mathematics professors. The subjects were 100 students in engineering, 32 in mathematics, and 16 in physics from three college-level institutions in the Los Angeles area.

Nine factor-analyzed abilities were measured: Numerical Facility, the ability to do simple numerical computations rapidly and accurately; Verbal Comprehension, the possession of a large reading vocabulary; Spatial Orientation, the ability to perceive spatial arrangements accurately and to maintain orientation with respect to objects in space; Spatial Visualization, the ability to visualize mentally the movement of objects into new positions in space; General Reasoning, the ability to determine what is given in a problem and what is asked for by the problem; Eduction of Conceptual Patterns, the ability to discover a principle, rule, or system; Originality,

[1] J. R. Hills, *Reports from the Psychological Laboratory* (Los Angeles: University of Southern California, 1955), No. 15.

the ability or tendency to produce uncommon, clever, or remotely related ideas, *i.e.*, the ability to go beyond conventional thinking; Adaptive Flexibility, the ability to change one's set or presupposition in order to meet new requirements, *e.g.*, to discard an old hypothesis or method in order to notice or find and use a new one to solve a problem; and Logical Evaluation, the ability to evaluate the logical consistency of given deductions.

Three criteria were used to evaluate success in mathematics. For each group of subjects the average grade in certain college mathematics courses was used as one criterion. For some of the subjects, ratings of aptitude or potential for mathematical work were obtained. For others, scores on a test of proficiency in mathematics were available as criterion evaluations.

The correlations obtained ranged from a −.44 to a +.72. Of the negative relationships, only two were statistically significant. In general, the measures of General Reasoning, Verbal Comprehension, Eduction of Conceptual Patterns, and Originality were unrelated to these criteria for these students. A number of the correlations between the other tests and the criteria were positive and significant.

The implication that there is no unique mathematical aptitude is derived from the fact that certain of the abilities measured in this study are related to success in mathematics in some curriculum-criterion-institution contexts but not in others. More explicitly, the three tests which had the highest positive correlations with the criteria, the measures of Adaptive Flexibility, Spatial Orientation, and Logical Evaluation, also had some zero and negative correlations. Whether a significant number of significant differences are present in the data cannot readily be ascertained in this particular study. However, a sizable number of these low correlations were significantly different in magnitude from the high correlations with the same test. For example, the test of Spatial Orientation had a significant positive correlation of .68 with ratings of mathematical aptitude of mathematics students at one institution. The same test had a correlation of only .02 with the average grade in mathematics courses of these same students.

Another example with this same test indicates that the problem is not just the grade criterion. In this case, scores on the measure of Spatial Orientation correlate .55 with the average mathematics grade of engineering students but −.16 with the grades, in the same courses at the same institution, of the physics students. Considered by themselves these correlations are significantly different, even though the physics and engineering students took the same courses at the same time and from the same instructors.

A third example involves the measure of Adaptive Flexibility. Scores on the measure of this factor correlated .68 with the ratings of physics students at one institution but −.08 and −.10 with the grades in mathematics courses and the tested mathematics proficiency of engineering students at another institution. Both of these negative correlations are significantly different from the correlation of .68. Many other examples could be cited, and the differences in correlation cannot be attributed to restriction of range phenomena.

Findings such as these, if substantiated by additional studies, imply that the psychometrist or counselor never will be able to find on his shelf a single test of mathematical aptitude. This statement assumes that we are not interested in assessing aptitude by means of examining past achievement. Of course, if we use measures which depend to any extent on past experience with mathematics, we defeat our purpose. The students who do well on such measures probably already know, through their experiences in mathematics courses, that they are good at mathematics. For increasing the scientific manpower pool we need devices which will locate the students who are not already studying mathematics and preparing themselves for careers which involve its use.

Another implication of these results is that there are many more potential scientists and technicians, at least as far as mathematical skill is concerned, than would be the case if there were a unique mathematical ability or constellation of abilities. If there are many aptitudes or sets of them which lead to success in mathematics, provided the person with such aptitudes is guided into a curriculum-criterion-institution context suited to him, there are probably many more people who could become skilled in the use of this basic tool of science.

If we are to capitalize on findings that several constellations of traits lead to success in this field, we must examine additional traits at other

institutions and with any other curricula which involve mathematics as a basic tool. A fairly limited set of traits may include those which are usefully related to success in this subject matter. This would be encouraging.

Moreover, a widespread and co-operative effort to collect local normative data on the useful traits for the curricula and criteria which are locally meaningful must be undertaken. The barriers to making these normative data from different institutions and curricula available to all persons involved in student selection and guidance must be removed.

When such steps have been completed, it should be possible for a counselor to measure the set of traits which are usefully associated with success in mathematics and inform an individual whether he shows promise in this basic tool subject and, if so, in what scientific or technical criterion - curriculum - institution contexts this is the case.

The Decline and Fall of High-School Physiology [1]

By SIDNEY ROSEN
Brandeis University, Waltham, Mass.

NATIONAL ATTENTION lately has focused on high-school science teaching, particularly because of an apparent insufficiency of scientists and technologists. Vocational decisions in the high school are often slanted away from science as a career. The most significant declines (for this atomic age) have been in the numbers of students electing physics and chemistry courses in high school.

Biology, the first high-school science area to undergo radical change in response to new trends in education, has profited from the lean years of chemistry and physics (Table 1). Dissatisfaction with high-school botany, zoology, and physiology, all miniature copies of elementary propaedeutic college courses, resulted, in 1909, in the introduction of a course fashioned by high-school teachers and called *General Biology*. This course is one of the two most popular science courses in American high schools today (the other is *General Science*) and is experienced by a majority of high-school pupils in preference to physics or chemistry.[2]

The decline of physiology teaching (Table 2) is especially significant as an example of both the workings of social and political forces and the influence of higher education on the high-school curriculum. It is interesting that physiology, like geography, once played a major role in the high school. Nevertheless, it became a candidate for oblivion because of legal strictures clamped on the subject through efforts of the Women's Christian Temperance Union and attempts of college lab physiologists to introduce research methods into the high-school course.

TABLE 1

Percentage of Pupils Enrolled in Biology, Chemistry, and Physics in the Last Four Years of Public High Schools and Total High-School Populations, 1890-1949*

Year	Gen. Biology	Chemistry	Physics	Total H. S. Pop.
1890	——	10.1	22.8	202,963
1900	——	7.7	19.0	519,251
1910	1.1	6.9	14.6	739,143
1915	6.9	7.4	14.2	1,165,495
1922	8.8	7.4	8.9	2,155,460
1928	13.6	7.1	6.8	2,896.630
1934	14.6	7.6	6.3	4,496,514
1949	18.4	7.6	5.4	5,399,452

*See footnote 1. The figures in Tables 1 and 2 are from Table 7, p. 107.

TABLE 2

Percentage of Pupils Enrolled in Physiology in the last Four Years of Public High Schools and Total High-School Population, 1890-1949

Year	% Enrolled	Total H. S. Pop.
1900	27.4	519,251
1910	15.3	739.143
1915	9.5	1,165,495
1922	5.1	2,155,460
1928	2.7	2,896,630
1934	1.8	4,496,514
1949	1.0	5,399,452

The curriculum of the first state normal school in the United States (Lexington, Mass., July, 1839), contained both physiology and natural history, and physiology became a regular part of

[1] Based on Ph.D. thesis, "A History of Science Teaching in the American Public High School, 1820-1920," Harvard University, 1955.

[2] M. C. Rice, R. C. Story, J. D. Hull, and G. S. Wright, "Offerings & Enrollments in High School Subjects," Chap. 5, *Biennial Survey of Education in the U.S.*, 1948-50 (Washington, D.C.: U.S. Govt. Printing Office, 1951), p. 13.

normal school curricula in Massachusetts as such schools were established. In April, 1850, the General Court of Massachusetts passed an act requiring that human physiology and hygiene be taught in all public schools and that all teachers be examined for their ability to teach these subjects. This law was the culmination of a vigorous campaign begun in 1843 by Horace Mann, then secretary of the Massachusetts Board of Education. The law was not mandatory for high schools; in 1857, physiology was not taught at either the Boston Latin School or English High School, but was given "with Lectures" in the second year of the Girl's High and Normal School. In 1872, physiology was legally required in high school in Illinois. By the end of the 19th century, it was taught in virtually every high school in the country.

Physiology was offered in the Philadelphia Central High School from its inception in 1839. By 1867, the special professor of physiology, Dr. J. F. Holt, was giving the two-year course a medical-school flavor. The School Report of that year noted: "It is desirable that the school should be provided with a dissected manikin, and with models of the vocal apparatus, of the eye, and of the internal organs, for the department of 'Anatomy and Physiology.'" In 1870, $600 was spent for such physiological apparatus. However, physiology teachers who were also physicians were the exception in high schools rather than the rule.

In general, whatever the background of the teacher, early physiology courses in high schools tended to be concerned with the factual details of body processes and gross anatomy. Most textbooks were designed to give a catechetical presentation of such subject matter. One text, Comstock's "Outline of Physiology" (New York, 1848), was extremely popular in female secondary schools. Written at a time when a controversy raged over the unhygienic effects of tightly laced corsets, Dr. Comstock wisely appended to the book a section on "The Application of These Physiological Principles to Muscular Exercises and Female Fashions and Deformities, Intended for the Use of Schools and Heads of Families."

Though an occasional large city high school, like the Philadelphia Central High School, offered a thorough course in physiology replete with models, the average classroom was apt to be bare of illustration except for the kind described in this account of a Connecticut school room in 1847: "Over the end of the room were suspended eight large drawings of the human stomach . . . representing the effects of alcoholic drinks. . . ."

Such physiological pictures in classrooms were due to the untiring efforts of the champions of temperance, from the 1830's until the turn of the century, to make physiology their vehicle for spreading a dread and hatred of alcohol. In accomplishing this, they inadvertently helped accomplish the downfall of physiology teaching in the high school.

The organization of the Women's Christian Temperance Union in 1875 increased the drive to make temperance education a required part of the school curriculum. In 1880, a "Department of Scientific Temperance Instruction in Schools and Colleges" was organized by Mrs. Mary Hunt for the W.C.T.U. in Boston. An example of her lobbying was the petitioning of the Cambridge, Mass., School Board in 1887 (with the endorsement of many prominent citizens) to set apart 20 minutes each week for instruction on the effects of alcohol on the human body.

Vermont was the first state to pass active legislation, in 1882, adding temperance teaching to the public-school curriculum: ". . . and elementary physiology and hygiene which shall give special prominence to the effects of alcoholic drinks, stimulants, and narcotics upon the human system. Textbook committees shall select a a textbook on elementary physiology and hygiene for use in their respective towns."[3] This kind of legislation spread rapidly: by 1886, 18 states, the District of Columbia, and all territories required the teaching of temperance physiology and hygiene in public schools.

Opposition to temperance legislation was active but futile. In some cases, politicians looked upon temperance physiology with indulgence and humor. The following doggerel was read before the Philadelphia legislature by one of its members in 1885:

> But now, Annus Domini, eighty-five,
> Blessed woman evolves a plan
> By which she eventually hopes to secure
> The absolute control of man.
> On his wines and beers, tobacco and cigars,

[3] As quoted in J. E. Foster, "Scientific Temperance Instruction in the Schools," proc. and addr., NEA, 1886, Salem, 1887, p. 83.

She will place a permanent lien,
By teaching the boys and girls to shout:
Physiology and Hygiene![4]

The W.C.T.U. legislation was designed to plug all possible loopholes. It spelled out exactly how many pages of a textbook should be devoted to alcohol and tobacco (1/5 of the book, or at least 20 pages) and designated minimum classroom times to be spent on the subject. One result was a textbook war among book publishers.

The pattern for textbook material was set chiefly by Mrs. Hunt's, "A Temperance Physiology" (New York, 1884). Endorsed by important medical authorities, this book interspersed simply stated physiological facts with a history of the manufacture and uses of alcohol: "There is one form of this disease called alcoholic consumption. . . . The drinker looks and feels well, till suddenly comes a 'dropped stitch,' or a pain in the side. Then follows difficulty of breathing and vomiting of blood; then a rapid passage to the grave. . . ."

It was not long before the textbooks which emerged in response to temperance laws began to be criticized for their slipshod and unreliable physiology. By the turn of the century, high-school teachers were insisting on relief from "the incubus of scientific temperance, so called . . . winding its tentacles about [physiology and hygiene] . . . sapping its strength and crushing out its usefulness."[5]

In many states the laws required the teaching of temperance physiology to all pupils from the third grade through the second year of high school, with a minimum of 30 lessons a year. At a time when the other sciences were being taught by the laboratory method, high-school physiology went on by recitation from temperance textbooks. This resulted in the repetition of the same general statements and warnings year after year from the same textbooks for the benefit of bored pupils.

While combating temperance physiology laws on one side, college physiologists and high-school physiology teachers were attempting to raise their subject to the level of botany and zoology, with a particular emphasis on laboratory method. A quasi-victory was won in 1896, when 16 colleges agreed to accept physiology for admission to the A.B. degree course.

In 1899, Harvard University added Anatomy, Physiology, and Hygiene (all one subject) as a one-credit elective to the admissions list and published a pamphlet listing an outline of requirements for the benefit of secondary schools. This action was in line with Harvard's attempt to stimulate the adoption of the laboratory method in secondary school science teaching. This movement had begun in 1886 with the acceptance of laboratory physics for admission. The response to the new elective must have been meagre, for in 1911 the subject of Anatomy, Physiology, and Hygiene was dropped from Harvard's admissions list. It is evident that high schools, in general, were unable to offer adequate instruction in laboratory physiology.

Students offering high-school physiology for admission to Harvard had to present a laboratory notebook at the time of the entrance examination. The kind of work Harvard demanded is evidenced by the recommended textbooks: Foster and Shore's "Elementary Physiology," a British import dealing thoroughly with the minutiae of anatomy, and Eddy's "Experiments in Physiology and Anatomy for High Schools," a manual whose opening laboratory exercises were in physics and chemistry. This college-flavored physiology found little favor with students and teachers.

By 1887, when the swing to the laboratory method of teaching physics, chemistry, botany, and zoology was already under way, high-school physiology still involved memorizing lists of anatomical names, chemical composition of tissues, and such from books. The average pupil neither witnessed a demonstration of physiological processes nor performed an experiment to make such processes real.

There were a few attempts by teachers to get away from a cut-and-dried laboratory approach in high-school physiology; but in 1907, the subject appeared to be failing to hold its place in the curriculum. An Iowa college physiologist ruefully observed in that year: " . . . there is no other subject on the high school curriculum that is so gracefully neglected by both teacher and pupil

[4] Foster, *op. cit.*, p. 98.

[5] W. T. Sedgewick and T. Hough, "What Training in Physiology and Hygiene May We Reasonably Expect of the Public Schools?" *School Science*, 3:437, Feb., 1904.

. . . no one wants to teach physiology; no one will if he can avoid it."[6]

While educational associations worked to repeal or amend scientific temperance laws, high-school physiology tended to move into the junior high school or toward integration with high-school zoology. The latter combination eventually became part of General Biology.

A momentary recovery was made by high-school physiology on the West Coast in 1930, when, in deference to a request by Stanford University and the Universities of California and Southern California, an examination in physiology and public health was added to the College Entrance Examination Board list. These universities paid the expense of preparing and administering the examination, which called for laboratory work and covered such items as metabolic processes, ecology, historical background of physiology, and applications of physiology in health, psychology, and sociology.

By 1933, however, only 31 candidates had taken the four examinations given. Accordingly, the physiology and public health examination was discontinued. In 1937, a similar fate befell the College Board examinations in botany and zoology.

[6] H. W. Norris, "The Teaching of Physiology," *School Science and Mathematics*, 7: 210, March, 1907.

Factors Related to Academic Probation Among Foreign Graduate Students

By PETER TIMOTHY HOUNTRAS
University of Michigan, Ann Arbor

IN A PREVIOUS ARTICLE[1] the writer analyzed the incidence of probation among foreign graduate students at the University of Michigan and concluded that they are more likely to incur academic deficiencies during the first two enrollments than at any other time during their subsequent residence. This paper treats selected factors related to the academic difficulties experienced by some students.

Wide experience with foreign students and their problems led some academic counselors to assume that country of origin and field of study are important factors associated with scholastic success. The evidence presented below confirms this notion.

Table 1 shows the relationship between country of birth (broadly classified) and achievement. The number of students from several countries were too few to permit statistical analysis. In order to include in the study all students for whom data were available, students from certain areas having cultural similarities had to be grouped. The broad geographical grouping employed in Table 1 is adapted from a scheme formulated by the Institute of International Education.

TABLE 1

Chi-Square Analysis of the Relation of Native Country (Broadly Classified) to Achievement

Grouping	Probationary	Non-probationary	Total	x^2
Africa	4	15	19	
British Empire	18	43	61	
Europe	19	28	47	16.96
Far East	155	198	353	
Latin America	26	21	47	
Near East	35	25	60	
Total	257	330	587	

Chi-square is significant at the one per cent level.

Proportionately more students from the Near East, Latin America, and the Far East incurred one or more warnings than did the students representing other geographical groupings. The chi-square of 16.96, for five degrees of freedom, was significant at the one per cent level. Only once in 100 trials could we attribute a similar distribution to errors in sampling. Insufficient knowledge of the English language at the time of entrance might account for much of the observed difference. Another possible explanation is that many probationary students, particularly those

[1] P. T. Hountras, SCHOOL AND SOCIETY, 84: 75-77, Sept. 1, 1956.

from Latin America, have pursued their undergraduate studies at institutions which have not qualified them to pursue graduate work at the university.

Is there any relationship between the fields of concentration (broadly classified) and achievement? Several departments were not sufficiently represented to yield to statistical treatment. As before, a modified scheme to include all students in our population was employed. In Table 2 the observed differences are such that only five times in 100 might they occur by chance, *i. e.*, as a result of sampling variation.

TABLE 2

Chi-Square Analysis of the Relation Between Broad Areas of Study and Achievement

Classification	Probationary	Non-probationary	Total	x^2
Physical Sciences	31	30	61	
Biological Sciences	26	42	68	10.44
Social Sciences	69	58	127	
Humanities	14	25	39	
Engineering	117	175	292	
Total	257	330	587	

Chi-square is significant at the five per cent level.

A proportionately greater number of students majoring in the social sciences and physical sciences incurred academic failure, whereas a proportionately smaller number of the students majoring in the humanities experienced similar academic difficulties. Perhaps the high incidence of probation in the social sciences may be attributed to the preponderance of verbal content in these fields which places foreign students with an initial language handicap at a disadvantage. A plausible reason for the failure experienced by students majoring in the physical sciences is that they were ill-prepared in their undergraduate studies to pursue advanced training in these fields. It is a well-known fact to most administrators that a considerable number of foreign universities lack adequate laboratory facilities for experimentation in the physical sciences.

A note of caution is indicated in interpreting the evidence. Several investigators have reported a significant relationship between field of concentration and grades earned. There is no general agreement, however, as to the specific departments in which the academically superior students are to be found. These conflicting findings may be attributed, in part, to the differences in standards for grading among the several institutions studied and even among the different departments within a single institution.

The conclusions which have been suggested above must, therefore, be viewed as tentative. Further research is unquestionably indicated before we can accept with a high degree of confidence the universality of the present findings with respect to foreign student achievement in the various graduate schools throughout the country.

REPORT

Heuristic Devices for the Teaching of Sociology

By MARVIN R. KOLLER
Kent (Ohio) State University

TEACHERS OF SOCIOLOGY should give more serious consideration to the development of teaching aids of a mechanical model nature to help them communicate significant sociological data. These heuristic devices may possibly supplement whatever skills or aids the teaching sociologist is already using.

In the belief that these devices will possibly enrich the teaching of sociology, the writer has experimented with some of these aids to sociological instruction in his classes in principles of sociology. Two different devices, the Oncue Demonstrator and the Stratigraph, were constructed and placed under test with three different "principles" classes at Kent State University. The Oncue Demonstrator was built to illustrate the relationships between "O.N." (Original Nature), "C" (Culture), and "U.E." (Unique Ex-

perience) for a given person. The Stratigraph was based upon Warner's six social class schema and illustrated vertical and horizontal mobilities possible for both white and non-white persons.

The writer devised tests consisting of 25 items each in social psychology and of social stratification, based upon the second edition of the text by John F. Cuber. Three classes were given these tests before the subject was discussed or assigned for reading. In each experiment, a control class received only the usual instruction. In the experimental classes, however, the devices were employed. Finally, by a test-retest of all classes, the improvement or non-improvement in test scores served as a measure of the effectiveness of the devices.

Inspection and statistical analyses of the raw scores of the control and experimental classes, both before and after the use of the devices, revealed that they contributed little to the substantive improvement of the various classes. However, from the point of view of the individual scores, a different picture was presented. If a member of the control group scored low on the first test (*e.g.*, 3), and a member of an experimental group scored high (*e.g.*, 24), then a positive change of one point for both would mean that the member of the control group moved only 1/22 of the total distance available to him while the member of the experimental group moved 1/1 or the greatest distance open to him. This ratio for the changes, positive or negative, made from the first to the second test to the total changes possible was computed for each individual. The analysis of variance for ratios of change to total change possible following the Oncue Demonstrator did not reveal an "F" at the five per cent level of confidence, but an "F" for the ratio of change following the Stratigraph experiments did yield an "F" at the five per cent level of confidence.

The experiments suggest that these heuristic devices did possibly have merit, particularly in the realm of increasing understanding of sociological materials for given students. However, not all students or all classes benefited by the use of these devices. As an exploratory study, the original idea that these devices may help begins to be substantiated.

Whenever the devices have been used in various classes, there has been a favorable response. An initial reaction was to express surprise because of their presence in the classroom. Their unusual appearance elicited considerable interest which soon gave way to enthusiasm as students learned the meaning of the devices.

The devices are in themselves abstractions, merely logical attempts to put into physical form some of the intangibles in the field of sociology. The student still has to grasp ideas conveyed by these "gimmicks." These could conceivably get in the way or block learning when supposedly they were created to solve some of the problems involved in mastering sociological concepts.

One of the lessons already learned in the development of these heuristic devices is that wood, metal, plastics, ceramics, cloth, and glass are limited in their properties of flexibility. How can one possibly convey the complexities or intricate nature of human relationships by means of such inert materials? The writer was forced to restrict the number of ideas that one device could illustrate, despite the obvious need to recognize other structures and processes which are related to a given theme. The dynamic character of social phenomena and the comparative static qualities of the materials employed in the devices seemed to be completely incompatible. However, by allowing for some movement within a given structure or by making changes in the light of experience with constant usage, the devices do appear to be practical for some instructors. If utilized with discretion, they could enrich the classroom experiences of many students of sociology.

EVENTS

Merit Rating of Teachers

One of the burning issues of the present in educational circles is the evaluation of teacher merit. Much has been written on this controversial question in the professional literature of the past few years, and even

popular publications have devoted attention to it. The arguments on both sides are deserving of much consideration.

Such an eminent leader in education as Dr. William Heard Kilpatrick has recently spoken out vigorously against merit rating of teachers. He stated that merit raises are possible in industry, which can determine efficiency on account of the fact that it is concerned with mechanical matters. On the other hand, in education, which deals with the problems of developing children's character and personality, Dr. Kilpatrick feels that merit rating of teachers is impossible.

In spite of the difficulties in the process of assessing the ability of instructors, there are important considerations and values in objectively determining whether the teacher is fulfilling his functions unsuccessfully, adequately, successfully, or exceptionally. We do not need to repeat the frequently expressed arguments or counterarguments, and we must not let ourselves be swayed by sentiments which interfere with the fullest functioning of the educational process.

It would be most unfortunate to dismiss the entire matter of teacher merit rating as impossible. The experimental attitude alone should prompt educators to keep an open mind on the subject. If the calling of the teacher is to be one of recognized professional status, the highest standards of preparation, in-service education, supervision, evaluation, and incentive should prevail. Society should do its best for the teacher and the teacher must do his best for the children. An equitable form of estimating teacher competence and merit will better help society toward the realization of its educational aims than a system in which teacher ability and achievement are not awarded due recognition.—W. W. B.

COLLEGE STUDENTS' CAREER CHOICES

AMERICAN COLLEGE STUDENTS seem to look forward to the careers they have chosen, according to a Cornell University study, released May 19, 1957, of 7,000 students in 12 schools throughout the country. Although the American economy offers 40,000 occupations to choose from, the study shows that 78% of the students questioned are "sold on" the fields they plan to enter.

Attitudes about occupations were part of a student values study sponsored by the Carnegie Corporation of New York and conducted by four Cornell sociologists, Morris Rosenberg, Rose K. Goldsen, Edward A. Suchman, and Robin M. Williams, Jr. The writers report that the job choices of nearly 70% of the students are "psychologically consistent," that their personalities and values fit their future work, and that a student is more likely to change his occupational plans to fit his values than vice versa. Self-confident students, for instance, are more likely to choose organizing and administrative work. Anxious personalities, who fear criticism, avoid occupations that carry responsibility for making decisions and supervising others.

Aggressive students are more likely to pick well-paying occupations, usually in business, while compliant types prefer work with people, as in social work or teaching. The "detached" type, who stress self-expression and avoid either being bossed or bossing others, choose independent professional occupations in art, medicine, farming, law, etc.

Students with less faith in others seem more likely to enter "manipulative" occupations like sales, promotion, business, advertising or public relations. More trustful students choose such "helpful" work as social work, teaching, or personnel.

The study showed that students are quite realistic about picking a career. For example, 46% said that ideally they would like to work in their own business or professional office, but only 19% expect to be independent.

Only five per cent of the women chose law, engineering, farming, or business—"men's work" selected by half the male students. Instead, half the women (and a seventh of the men) chose social work, teaching, art, journalism, drama, or secretarial work.

Students tend to emphasize what they can give to a job rather than what they get for it. Asked what they wanted most from their work, 27% said "an opportunity to use my special abilities" while only one-tenth stressed "earning a good deal of money." A quarter, however, want "a stable, secure future."

The desire to be creative may be a handicap in our "increasingly bureaucratized occupational structure," but college graduates, an occupationally elite group, have the best chance for creative work.

A majority of the students named "hard work" and "a pleasant personality" as the most important factors in getting ahead, while half as many listed "brains" or "knowing the right people."

This emphasis on practical application to work, the sociologists say, has a lot to do with our nation's superior production, but, of course, is not the only factor. Moreover, from a personal point of view, a graduate with these values may become frustrated and cynical if he finds that other factors are really most important.

The students' values of being well liked and getting along with people may have both positive and negative repercussions in a job situation—on the positive side enhancing the rewards of jobs entailing contact with the public, but on the negative side running a risk of suppressing real feelings in order to make the right impression.

What the sociologists call "anticipatory socialization" helps students to make a smooth transition to the outside world. While still in college, a student begins to think of himself as a doctor, lawyer, engineer, etc., and to act that part.

The study also found that students who have begun the long training for fields like these are less likely to change their minds about their careers than students whose skills will be learned on the job.

NEW DIVISIONAL COURSES FOR SENIORS AT POMONA

IN ANSWER to the contention that college educations are becoming too specialized, Pomona College this fall launched an experiment with divisional courses for its seniors. The college has received a grant of $100,000 from the Carnegie Foundation to establish the courses for a three-year program. Three such courses will be offered in each of the college's three divisions — the humanities, the social sciences, and the physical sciences.

Only a senior will be eligible to take one of the courses, and he may take only the course offered in the division in which he is concentrating. The courses, each with three credits per semester, will cross boundaries of academic fields. Instructors of history, English, and art will teach the course in the humanities division. Economics, government, and philosophy faculty will teach the social sciences course, and philosophy, physics, and chemistry teachers will instruct the natural sciences course.

President E. Wilson Lyon said the courses will concentrate on raising questions in the student's mind, rather than on giving him all the answers. "We want the students to note the relationships between the fields of learning," he said. "We want the economist to think with the historian, the writers to think with the artists, and to bring out that much more is involved in life than the tiny field of their own individual specialization."

Dr. W. T. Jones, professor of philosophy who has been named general chairman of the program, said the courses will emphasize that lines of demarcation between academic fields are arbitrary and that conclusions within fields are tentative and conditional. He stated:

> We live in an age of specialization and one of the weaknesses of specialism is that it tends to cut up the whole of knowledge into little segments and then to focus the student's attention on getting the "right answers" in one of these segments.
>
> Even good students tend too readily to believe what they are told. They accept as gospel truth assertions that their teachers recognize to be but tentative hypotheses subject to correction in the light of further experience.
>
> To a large extent we have become a society of learned ignoramuses, unable to communicate effectively with those in other fields. We are prisoners of the jargon of our own professions.
>
> Too often we are unaware of, or indifferent to, the larger environment in which our specialized knowledge is developing and in which our actions are taking place.

The cultural history of Europe from the 1880s to the 1930s will be considered in the humanities course, "Turning Points of Western Culture." The social science seminar, "The Individual and the New Leviathan," will be devoted to problems of large-scale organization in economics and government and the individual's relationship to the changing society. The natural science course on "Turning Points in Physical Science" will consider the evolution of scientific theory.

"SUPERIOR" AND "GOOD" TEACHERS

AT THE ANNUAL CONVENTION of the American Psychological Association, Sept. 1, 1957, David G. Ryans, director of the Teacher Characteristics Study at the University of California, Los Angeles, presented an analysis of the qualities more frequently associated with good than with poor teachers.

Superintendents of schools, professors of education, and researchers have long sought reliable means for predicting the eventual classroom effectiveness of the budding teacher. In an effort to spot promising recruits early in the training process, Dr. Ryans and his group administered the "Teacher Characteristics Schedule" to two groups of teachers—a group which had been judged "superior" in classroom performance and one which had been judged "inferior." The Schedule, which contains verbal items as well as pictorial materials, turned up some notable differences between the two groups.

As compared with ineffective teachers, the good teachers are more frequently most generous in their appraisals of the behavior and motives of other persons. They are strongly interested in literary matters, lean toward the fine arts, and through their life have tended to socialize extensively. In addition, the effective teachers more frequently enjoy teacher-pupil relationships and in their teaching techniques favor those which allow pupils a good deal of free expression. The highly effective classroom teacher has superior verbal intelligence and is above-average in emotional adjustment. As contrasted with his less effective colleague, the really good teacher tends to judge himself high in ambition and initiative.

While the results reported are only part of a larger study, they can be expected, Dr. Ryans believes, to furnish useful clues to those concerned with the selection, training, and hiring of teachers.

RELIEVING COLLEGE ENROLLMENT PRESSURES

A STIFFER ADMISSIONS POLICY and more student responsibility are two ways to alleviate the pressures of increased enrollment, stated Barnaby Keeney, president of Brown University, at the opening convocation of the University of Massachusetts, Sept. 12, 1957. Dr. Keeney urged colleges to exclude the below-average student and at the same time seek out the "extraordinarily able" students who do not find their way to college campuses. Colleges can no longer make education painless because "we shall not have in ten years twice as many teachers to sugar-coat twice as many pills.

"We have for many years admitted many people who had no other qualifications for college than a half-formed desire to attend." One result has been that "less than half the people who enter colleges finally graduate, and of the lost half, a good many are dismissed for academic reasons—many of them

A sociological analysis of the problems of education

SOCIETY and EDUCATION

by

Robert J. Havighurst

and

Bernice L. Neugarten

Pioneering in the study of the relation between the school and the social structure, this penetrating text examines the educational system from two points of reference—the school as an agent of society seeking to perpetuate its ideals and values, and the school as a primary formative influence on the social development of the child.

The social class structure of America, the social life-space of the child, the effect of peer groups, youth-serving agencies, comics and television on the child and adolescent, the social origins and career lines of teachers, are among the topics explored for the light they shed on the way children form social loyalties and on the manner in which the school participates in the shaping of these loyalties.

465 pp. *6" x 9"*

Examination copies available. Write:

ALLYN and BACON ***College Division***

41 Mt. Vernon Street, Boston 8, Mass.

A and B

because they do not have the ability to do the work."

The stiffer admission policy favored by Dr. Keeney does not exclude the student who is "only a little better than average—but [does exclude] the student who is a little below average.

"At the same time as we admit quite cheerfully students who cannot do our work, we fail to seek out and drag in some extraordinarily able people.

"It is estimated that as many as 40 per cent of the most able quarter of high school graduates never enter college. This is as wasteful in its way as admitting people who cannot and will not use college.

"Some of these do not enter because they cannot afford to, but others do not because they have never been stimulated to do so in their schools or at home."

The greatest opportunity in education, Dr. Keeney feels, is placing more responsibility upon the student for his own education. "Today we involve a relatively small percentage of our students in active participation in their own education. . . . The greatest opportunity that is before any of us is to arouse our students—and this they must do mostly by themselves."

With the tremendous pressures placed on private and public institutions to admit more students, Dr. Keeney said, "It is therefore assumed . . . that our colleges and universities must increase in size as the population increases. If educators tacitly accept this assumption and allow their institutions to grow without using this opportunity to change some of our practices, and to demand a great many things we do not now have, the next decade will be one of crisis, of opportunity lost and of national tragedy."

Unless colleges expand their resources, "Twice as many students will inevitably mean half as much education for each of them—and half of what we have now is not enough to go around."

COURSES IN RELIGION AT UNIVERSITY OF ILLINOIS

CHURCH FOUNDATIONS representing 11 denominations at the University of Illinois are conducting this fall 21 courses in religion for which the university will grant credit toward graduation. Fifteen courses are offered by Protestant denominations, four by the Newman Foundation (Roman Catholic), and two by the Hillel Foundation (Jewish). Protestant foundations presenting or co-operating in these courses include the Baptist, Disciples, McKinley (Presbyterian), Seabury (Congregational), Wesley (Methodist), Southern Baptist, McGarvey (Church of Christ), Lutheran Student Center, and Episcopal.

Faculty and course content must meet university standards and classes must be held in other than university buildings. Sophomores, juniors, and seniors may take as many of these courses as they wish, but graduation credit is limited to a total of 10 semester hours.

Typical courses deal with "Life and Teachings of Christ," "Literature of the Old Testament," "Chris-

THE INDEPENDENT STUDY PROGRAM IN THE UNITED STATES

By ROBERT H. BONTHIUS, F. JAMES DAVIS, *and* J. GARBER DRUSHAL, *in collaboration with* FRANCES V. GUILLE *and* WARREN P. SPENCER. A report on an undergraduate instructional method, this book is the first to provide a comprehensive analysis of independent study programs in the United States. It appraises the effectiveness and value of existing programs and indicates how programs of independent study can be used both to ease conditions in overcrowded classrooms and to improve the quality of individual learning and scholarship. **$4.50**

SOVIET EDUCATION

Edited by GEORGE L. KLINE, *with a Foreword by* GEORGE S. COUNTS. These nine first-hand reports by former Soviet teachers and students provide a unique source of insights into the day-by-day functioning of the Soviet educational system during the 1920s, 1930s, and early 1940s. The reports convey the intimate texture of student life, of student-teacher relations, and of the actual operation of the system of admissions, examinations, and lectures. **$3.50**

THE DEVELOPMENT OF ACADEMIC FREEDOM IN THE UNITED STATES

By RICHARD HOFSTADTER *and* WALTER P. METZGER. Beginning with the foundation of academic freedom in the achievements of the medieval masters, the authors trace the development of academic freedom through its European background and up to the distinctly American system of education of the present day. The volume "provides the indispensable background for any appraisal of the contemporary state of American academic freedom."—*The Journal of Higher Education* **$5.50**

INTERNATIONAL YEARBOOK OF EDUCATION, 1955

Covering sixty-nine countries, this seventeenth edition first discusses educational developments in various parts of the world and then presents a detailed report on each country. Specific information is given on administration, compulsory and free education; primary, secondary, vocational, and higher education; and teaching staff. *A UNESCO publication.* **$3.50**

COLUMBIA UNIVERSITY PRESS
2960 Broadway, New York 27, N. Y.
Publishers of THE COLUMBIA ENCYCLOPEDIA

The 1957 Year Book of Education

EDUCATION AND PHILOSOPHY

Edited by George Z. F. Bereday
and J. A. Lauwerys

This unusually comprehensive volume, the fifth of a distinguished series prepared under the auspices of the University of London Institute of Education and Teachers College, Columbia University, examines the relationship that exists between philosophical systems and educational practices, showing how the philosophy of a society is revealed in the operation of its educational institutions. Some forty eminently qualified persons throughout the world contribute to this global view. An invaluable work for the serious student of education and philosophy.

WORLD BOOK COMPANY Yonkers-on-Hudson New York

tian Ethics," "Roman Liturgy," and "Church History." A popular course offered by the Newman Foundation is "Catholic Marriage and Family Life," now in its 14th year.

In addition, the university's philosophy department offers World Religions, Philosophy of Religion, Comparative Religion, and Contemporary Religious Thought. These are conducted by regular faculty and carry unrestricted credit.

RECENT *Publications*

The following are 1957 editions, except where indicated otherwise

KOENIG, SAMUEL. *Man and Society: The Basic Teachings of Sociology.* Pp. 339. Barnes & Noble, New York 3. $1.45 (paper).

KYTE, GEORGE C. *The Elementary School Teacher at Work,* pp. 530, $5.25; MILLARD, CECIL V., *et al., The Elementary School Child: A Book of Cases,* pp. 660, $4.90. Dryden Press, New York 19.

LARSON, LEONARD A., and LUCILLE F. HILL, *Physical Education in the Elementary School,* pp. 376, $5.75; LEE, GORDON C., *An Introduction to Education in Modern America,* revised edition, pp. 624, $5.25. Henry Holt and Co., New York 17.

LINDSEY, MARGARET, and WILLIAM T. GRUHN, *Student Teaching in the Elementary School,* Pp. 214, $3.75; ROSENSTENGEL, WILLIAM E., and JEFFERSON N. EASTMOND, *School Finance: Its Theory and Practice,* pp. 442, $6.50; STROUP, FRANCIS, *Measurements in Physical Education: An Introduction to Its Use,* pp. 102, $3.50. Ronald Press, New York 10.

LUNN, HARRY H. *The Student's Role in College Policy-Making.* Pp. 100. American Council on Education, Washington, D. C. $1.00.

McARDLE, SISTER M. MARGUERITE. *The Teaching of Reading in the Elementary School.* Pp. 160. Catholic University of America Press, Washington 17, D. C. $2.75.

MORGAN, ARTHUR E. *The Community of the Future and the Future of Community.* Pp. 166. Community Service, Yellow Springs, Ohio. $3.00.

New World Writing No. 11. Pp. 288. New American Library, New York 22. 50 cents.

SCOTT, J. IRVING E. *Getting the Most out of High School.* Pp. 144. Oceana Publications, New York 3. $2.50.

Teachers Guide to Education in Later Childhood. Pp. 615. California State Department of Education, Sacramento.

WIGGINS, SAM P. *The Student Teacher in Action.* Pp. 217. Allyn and Bacon, New York 11. $2.95.

Coming in November

WHAT IS INDOCTRINATION?

THE EDUCATION OF GIFTED CHILDREN

NEW STUDENTS LACK STUDY TECHNIQUES

EVALUATING RESEARCH

SCHOOL and SOCIETY

New HARPER Books on Education

The Teacher's Role in American Society

Edited by LINDLEY J. STILES, University of Wisconsin

The civic and social no less than the educational role of the teacher is the subject of this analysis by a distinguished group of educators. In light of the recent transitional period of confusion and frustration for the public school teacher, the contributors seek to clarify his altered status, the social forces he confronts in his life and work, the professional problems he faces, and the progress in status gradually being made. They give fresh insight—for teacher and layman alike—into the complexities of the teacher's social and professional relations, conduct as a private person, and responsibilities and special limitations as a citizen.

". . . an unequalled opportunity to see the teacher as he views himself."

—*Library Journal*

14th Yearbook of the JOHN DEWEY SOCIETY $4.00

Cultural Foundations of Education: AN INTERDISCIPLINARY EXPLORATION

By THEODORE BRAMELD, author of "Ends and Means in Education"
Foreword by CLYDE KLUCKHORN

A systematic examination of the theoretical foundations of education in terms of the meaning of culture. The author draws heavily on the most authoritative anthropological thought and research, the philosophy of culture, and the behavioral sciences, interpreting these within a framework that relates the parts to an organized whole. He emphasizes the great problems civilization faces in an age of abnormal change, and the opportunities that confront education in dealing with these problems. For all who are concerned with education as a basic cultural institution, a provocative interdisciplinary synthesis.

". . . introduces the cultural approach of the anthropologist to the educator. As such, and on its own merits, one of the most important contributions to the theory and practice of education to appear in our time."

—M. F. ASHLEY MONTAGU

$5.00

At your bookstore or from **HARPER & BROTHERS** 49 E. 33rd St., N. Y. 16

MR. STEVENS RICE
UNIVERSITY MICROFILMS
313 N. FIRST ST.
ANN ARBOR, MICH.

FREE

Selected RONALD *Books*

TEACHING in HIGH SCHOOL – Second Edition

By **Hubert H. Mills** *and* **Harl R. Douglass,** *both University of Colorado*

Today's high school teacher as the director of student learning. Book analyzes his relationships with pupils, co-workers, and community. Shows how to use various teaching procedures—all based on sound principles of learning. Covers: adaptation of psychological, sociological principles; curricular materials for traditional, core curriculum classes; procedures for dealing effectively with different student abilities, needs, backgrounds, interests, etc. *"The new topics in the Second Edition are timely and presented fully."*—**HELEN M. REED, University of Kentucky.** *15 ills., 516 pp*

CURRICULUM FOR ELEMENTARY SCHOOL CHILDREN

By **Beatrice Davis Hurley,** *New York University*

This new textbook narrows the gap between educational theory and current practices of the elementary school curriculum. It describes the historical development of the elementary school curriculum and discusses teaching and learning dynamics. Chapters analyze each content area of the curriculum, showing its contribution to child development, outlining effective teaching procedures, indicating sources of content enrichment, and suggesting methods of evaluating growth. *"A creative approach that should challenge elementary teachers."* —**G. MARION YOUNG, University of Florida.** *31 ills., 402 pp.*

PRINCIPLES and PROCEDURES of CURRICULUM IMPROVEMENT

By **Vernon E. Anderson,** *University of Maryland*

All aspects of curriculum construction and improvement in school and classroom—with illustrations from elementary, secondary, and college levels. This popular textbook contrasts the problem-solving approach with the subject-centered. Evidence from research in child, adolescent, social psychology; learning theory; anthropology; and sociology is presented in terms of implications for the curriculum. Special attention to the human relationships and practical procedures involved in putting through curriculum change. *"As comprehensive a book on the subject as has ever appeared."* — **EDUCATION.** *468 pp.*

CONSERVATION EDUCATION in AMERICAN COLLEGES

By **Charles E. Lively,** *University of Missouri;*
and **Jack J. Preiss,** *Michigan State University*

Just Published! This new book reports the findings of the first nationwide survey —sponsored by the Conservation Foundation—of the teaching of conservation in the colleges and universities of the United States. It describes conservation as a social process and defines the tasks it must perform. Book concisely reviews the historical development of conservation education in the U.S. and explains the objectives of the survey, its methods, and important findings. Includes a summary of the survey's implications as well as the authors' perceptive recommendations.

85 ills., tables; 320 pp.

THE RONALD PRESS COMPANY • 15 East 26th St., New York 10